How does understanding inequality contribute to implementation of sustainable transitions?

Introduction

Inequality and environmental exploitation are both intuitively and empirically linked. Comparative emissions between rich and poor are intensely unequal: only 16% of global greenhouse gas (GHG) emissions are attributed to the bottom half of the world's population while 23% are due to the top 1% since 1990 (Figure 1) (Chancel, 2022). Studies also show that increasing income inequality disproportionately amplifies inequality in energy consumption (Oswald *et al.*, 2020), and that net income is the most significant predictor of emissions (Nässén *et al.*, 2015). Beyond emissions, inequality is negatively correlated with general environmental quality. Inequality manifests at the household, community, national, and international scale to degrade the environment (Islam, 2015). Focusing on the national channel of influence, within-country income inequality specifically has been shown to increase carbon emissions (Khan *et al.*, 2022). With global temperature increase at 1.1°C and rising (GISTEMP Team, 2022) and 68% of wild animal populations lost since 1970 (WWF, 2020), it is clear there is an environmental crisis, and a transition to a more sustainable way of living is needed.

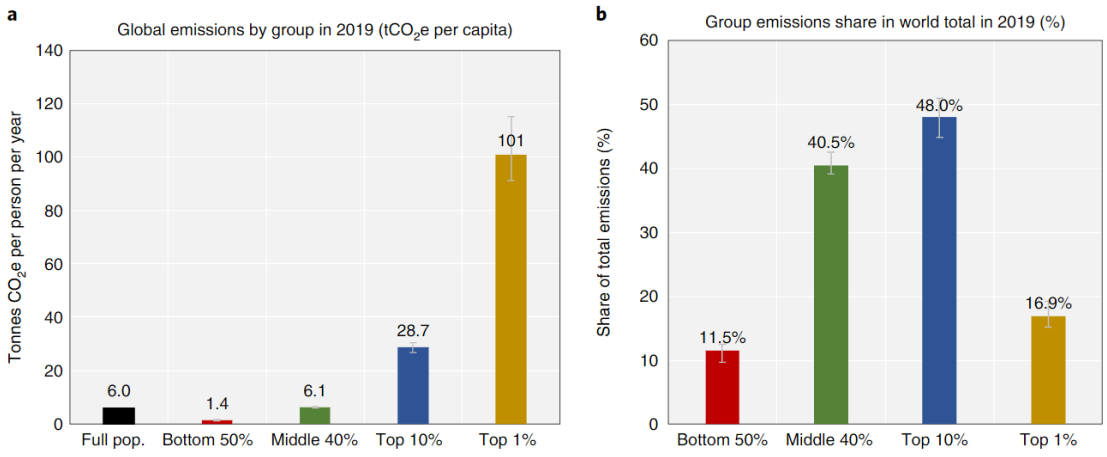

Figure 1: Income and carbon emission inequality in 2019 (Chancel, 2022)

Why is inequality related to environmental destruction, and how does considering inequality clarify understanding of sustainability transitions? This paper will explore first how domestic[1] inequality in developed countries helps explain the causes of environmental degradation through unequal influence on governance and managing common pool resources. Second, it will review who is disproportionately affected by poor environmental quality as a result of poor governance. Next, it proposes that understanding inequality's effects inequality demonstrates solutions to the environmental crisis through improving equality efforts in national governance. Finally, it will counter arguments that inequality has a beneficial environmental effect and concludes that addressing inequality is an important component to enacting sustainability transitions in domestic governance in developed countries.

Power inequality and how environmental exploitation is allowed

Inequality is a critical component of the origins of the current environmental crisis through the formation and application of regulations and governance of resources. A certain amount of natural resource use is necessary to support human needs such as food, shelter, and clothing. For the beneficiaries, the direct advantages of natural resource use are clear, while the overall costs to society are dispersed (e.g., deforesting an area to develop a neighborhood has immediate benefits to those developing the housing, while the loss of carbon sequestration and biodiverse habitat of the forest is spread among the community). Generally, a government weighs the benefits and costs to find an optimal decision point where the overall benefits outweigh the costs to society. Boyce (1994) put forward the power weighted social decision rule (PWSDR) explaining how the powerful[2] can exploit the power imbalance to influence cost-benefit decisions to allow environmental degradation beyond what is

[1] International inequality also plays a significant role in environmental quality and which people feels the effects; the developed world emits the majority of carbon but the developing world is already affected the most (Mendelsohn *et al.*, 2006). International inequality and governance are not addressed in this paper to control the scope but are important nonetheless.

[2] Corporations are considered people under some facets of American law and wield great power (Johnson, 2011). Thus this essay will refer to corporations as powerful actors that exploit inequality.

optimal for society. First, the winners from any deteriorating activity, such as the housing developers in the previous example, are generally more powerful and invested in the outcome than the losers, the community at large. Thus, they are motivated and able to lobby in their favor, i.e. towards more environmental deterioration. Second, it is difficult for the losers to lobby due to a) the high transaction costs in terms of time, effort, and money of lobbying, b) a possible lack of knowledge of the decision or costs to them of the decision, or c) the fact that harm will occur in the future to losers that do not yet exist and thus cannot lobby. This shifts the cost-benefit outcome away from the optimal point and towards more benefit to the winners (and more cost to the losers) as shown in Figure 2. Therefore, the final outcome is a function of the inequality between winners and losers, and greater inequality leads to greater degradation (Boyce, 1994).

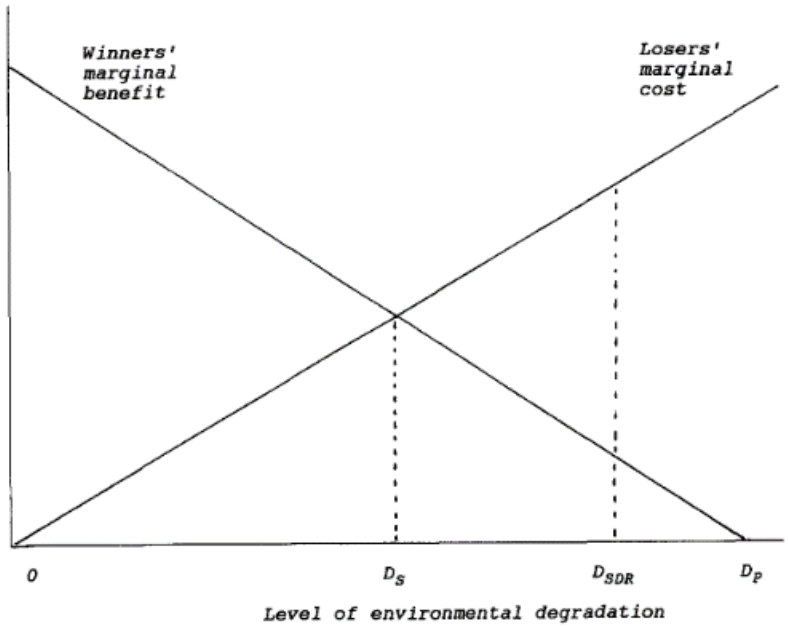

Figure 2: The power-weighted decicion rule. D_s is the optimal balance for society, while D_{sdr} is the outcome under the power-weighted social decision rule (Boyce, 1994).

The PWSDR is manifested in the development of environmental governance in countries globally. For example, between 1990 and 2015 in 34 developed and emerging nations (including OECD[3] nations and BRIICS[4]), a statistically significant negative correlation was found between the presence and wealth of fossil fuel and energy intensive industries and the strength of emissions regulations, such as emissions trading and carbon taxes (Stevens, 2019). This illustrates the effect of inequality because as these industries grow in size and power they are more able to influence regulations in their favor. This comes at a cost to society, as it is well known that increasing carbon emissions from burning fossil fuels is causing destructive climate change. A specific example of this trend, explained by Meng and Rode (2019), occurred in the US in 2009 when the Waxman-Markey bill was under consideration in Congress. The bill was the most significant climate legislation ever at the time and included the establishment of carbon cap-and-trade regulations. The bill failed to pass, and the data showed that lobbying against the bill played a significant role in its failure: lobbying by corporations that stood to lose from the law decreased the likelihood of passage by 13%. There was also a statistically significant relationship between the magnitude of the expected gain or loss from the law and the amount of money spent on lobbying (Meng and Rode, 2019). Given that the US did not pass any other major climate legislation until 2022[5] which did not include a carbon tax or cap (The White House, 2022), the 13-year delay in national climate action and the ensuing emissions certainly qualifies as pushing the social decision point past the optimal level. This allowed the winners to continue to exploit the environment. The PWSDR summarizes how power inequality has allowed and continues to allow the powerful to exploit and destroy the environment through influence on governance, contributing to the climate crisis.

[3] Organization for Economic Cooperation and Development
[4] Brazil, Russia, India, Indonesia, China, and South Africa
[5] Inflation Reduction Act (The White House, 2022)

Power inequality also negatively affects management of 'the commons,' or common pool resources (CPR). CPRs are resources that are available to everyone, barring expensive exclusion tactics, but are limited and can be over-consumed, such as fishery populations, urban land, or common grazing lands (Ostrom *et al.*, 1999)**.** Inequality has a profound effect on the dynamics of governing the commons. Though local governance and cooperation can successfully govern CPRs, 'cooperation' and 'consensus' can be forced upon low-power players in the group by higher power players (Kashwan *et al.*, 2021). An example is the development of the US interstate highway system through urban centers in the 1950s-60s. The interstates were billed as a common good to increase ease of travel and economic flow between areas and used the common resource of real estate (Weingroff, 1996). According to Archer (2020), Black communities were disproportionately harmed by this development project on the commons. Black neighborhoods such as Rondo in St. Paul, Minnesota, the Hill District in Pittsburg, Pennsylvania, and Overtown in Miami, Florida were razed or divided by the construction of the highways, forcing thousands from their homes. These decisions were explicitly racially motivated and intended to keep the already oppressed Black population down by physically cutting them off from other public benefits like easy access to parks or downtown economic areas (Archer, 2020). Overarching this tragedy is the fact that the 'common good' of increased motor vehicle transport is detrimental for everyone: cars contribute significantly to global carbon emissions and pollution, and the development of more road infrastructure increases car use (Handy and Boarnet, 2014)[6]. This example demonstrates how power inequality in the management of common pool resources can lead to inferior management of the CPR to the disadvantage of the least powerful. Overall, power inequality adversely impacts

[6] The transition from electric rail transportation to the dominance of the combustion engine car in the early 1900s was in itself orchestrated by powerful corporate interests such as General Motors for their own profit; see Snell (1974) for more information

environmental governance through the development of regulations and management of CPRs contributing to the environmental crisis.

Inequality and who suffers from environmental damage

Inequality makes evident who is often harmed by the environmental effects of poor governance: the least powerful communities (determined by racism, classism, and other systems of inequality). First, the marginalized are usually on the front lines of bearing the direct impacts of the elite-influenced decisions. Returning to the case of the US Interstate system, Black communities, partially due to highways being built disproportionately through their neighborhoods, now experience more air pollution from traffic and transport sources than White people ((Jbaily *et al.*, 2022; Liu *et al.*, 2021; Tessum *et al.*, 2021). Both economic status and, more significantly, race are statistically proven predictors of the air pollution experienced (Tessum *et al.*, 2021). Air pollution contributes to worse health in these communities through asthma, cardiovascular disease, and respiratory disease, increasing mortality (Kampa and Castanas, 2008)**.** Furthermore, race is the strongest predictor of who lives next to a hazardous toxic waste site in the US; this is specifically because corporations follow the 'path of least resistance' when finding places to build industrial sites (Bullard *et al.*, 2005). As explained by Boyce (1994), the already-disadvantaged offer the least resistance to having toxic waste placed in their backyard due to the transaction costs (time, effort, and money) and information needed to lobby. Needless to say, living next to hazardous waste dramatically worsens health, including higher risk of birth defects and cancer (Vrijheid, 2000). These examples show how the least powerful communities in a country suffer the worst effects of environmental destruction caused by the decisions of the elite.

Moreover, the elite (again determined by race, class, and other systems of inequality) can use their power to isolate themselves from the effects of the degradation they cause, severing the link between

the damage caused and the effects felt (Islam, 2015). For example, some members of the 'tech elite' (e.g., Peter Thiel, founder of Paypal) have used their wealth to buy large swaths of land in New Zealand, obtain citizenship, and build 'societal collapse safe havens' in what they consider to be a secluded and secure location (O'Connell, 2018). The option of holding a new citizenship on retainer to flee to by private jet at any time to avoid the effects of climate change, political instability, or other disasters is simply not available to most of the world, and that is exactly what makes it a plausible escape mechanism for the rich. Domestic inequality thus enables the effects of environmental degradation to be forced on the marginalized and avoided by the elites.

Inequality and how a sustainable transition occurs

By understanding inequality as a root cause of environmental degradation and an explanation of who suffers most from it, the inequality theory points to pathways towards a sustainable society via more equal societies. This is upheld by empirical studies: Knight and Rosa (2011) showed that countries with high inequality use energy to create well-being for their citizens less efficiently than more equal countries, and Millward-Hopkins (2022) found that high inequality can double the energy required to meet basic needs. To go further, Vogel *et al*. (2021) showed that equality is a beneficial social factor for providing more human 'need satisfaction' per energy used. They studied multiple dimensions of need satisfaction such as life expectancy, education, minimum income, and food, water, and sanitation access in relation to energy use across data from 106 countries. Then social factors such as income equality, democratic quality, economic growth, and electricity access were analyzed to see their effect on the need satisfaction – energy use relationship. Vogel *et al.* found that countries with high income equality, democratic quality, and public service quality and low extractivism[7] were able to satisfy more needs

[7] Extractivism is the practice of removing natural resources from the environment as a major component of the economy (Vogel *et al.,* 2021)

using less energy (Figure 3). Since one of the tensions in social sustainability transitions is balancing energy and resource usage against providing well-being for people, this is an important finding: the socioeconomic structure of a society affects how energy can be used (Vogel *et al.*, 2021). Equality is enmeshed in both the beneficial and detrimental factors, demonstrating its important role in the sustainable transition. Income equality itself is a beneficial factor. Moreover, the other beneficial factors (quality democracy, public services, public health coverage, electricity access) contribute to an equitable society by increasing the services available to all, including the most vulnerable and marginalized. The detrimental factors, extractivism and economic growth, are the motive and mechanism for so much environmental destruction that the powerful often push for, so reducing these factors is a further indicator that a more equal society is more sustainable. Reducing inequality is therefore critical for a transition to sustainability.

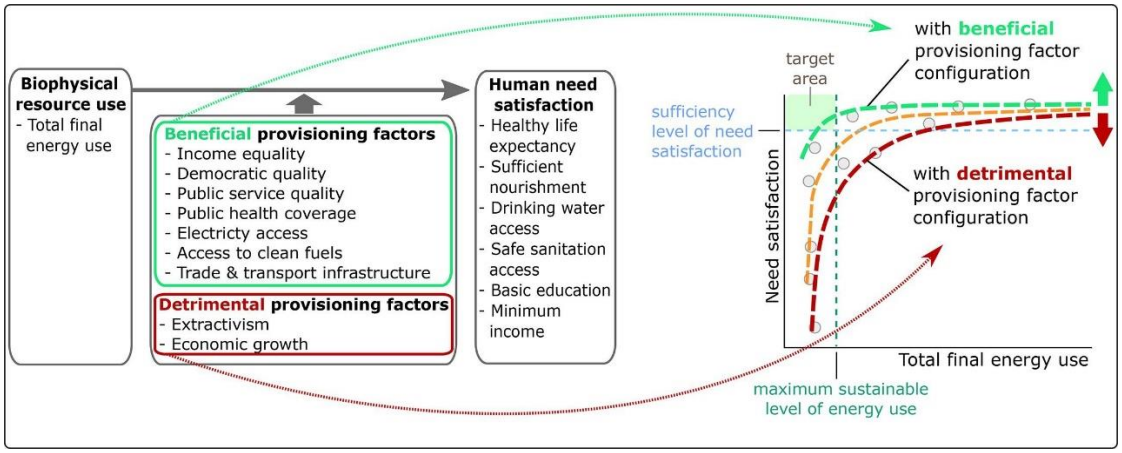

Figure 3: Need satisfaction vs energy use according to Vogel et al. (2021); beneficial social factors increase the efficiency of need satisfaction including equality

One mechanism that allows a more equal and equitable society to be more sustainable is more effective governance. People act in accordance with how fair they perceive a situation to be (Eek and Biel, 2003). For example, when citizens think other people are paying their taxes, they themselves are more likely to pay their taxes (Frey and Torgler, 2007). Thus, more equal societies, not fearing exploitation by the

extremely powerful, will have a higher compliance rate with environmental regulations. Additionally, more equal political power amongst economic groups has been shown to create higher quality institutions and government (Ezcurra and Zuazu, 2022) . Given the PWSDR, it is clear that power equality assures more societally optimal decisions by decreasing the imbalance between winners and losers. Improved equality also increases trust which improves the ability to act for the common good (Wilkinson *et al.*, 2010). Accordingly, it has been shown that when political trust is higher people are more likely to accept economic sacrifice to protect the environment (Harring, 2013), making the optimal balance between economic success and environmental quality even more likely to be found. Additionally, Ostrom *et al*. (1999) explains that trust and compliance in the wider social landscape are key prerequisites for effectively managing CPRs. For example, in her book on the subject of local CPR management, Ostrom (1990) analyzes the mountain grazing management practices of a Swiss village and finds that equality in distribution of labor, returns, and rule-making is critical for the effective management which has endured for hundreds of years. Therefore, equality is needed as a foundation for social trust and fairness to allow effective environmental governance.

Counter argument: Inequality as beneficial to the environment

Some argue that it is possible for society to undergo a sustainable transition without addressing inequality. For example, Olson (1971) asserts that when a small minority has the most control and use of a CPR, they stand to benefit the most from conserving it. Because they have an outsize influence on the CPR their actions can affect the total outcome of the CPR, and thus they are incentivized to protect it. Folke *et al.* (2019) and Hamann *et al.* (2018) say that high market concentration could have the same effect for corporate interests in CPR; the most powerful can choose to act environmentally responsibly specifically because their power ensures their actions will be effective, and they can continue to profit off the CPR. Nielsen *et al.* (2021) outlines the role of the socioeconomic elite in environmental outcomes

and posits that they could exert their power for sustainable transitions using their positions as consumers, investors, role models, organizational participants, and citizens. Indeed, environmental benefits from inequality have been observed in certain cases. For example, governments in countries with less democracy and more inequality set aside more conservation areas (Kashwan, 2017). A working group of transnational fishing corporations and scientists co-developed a sustainable seafood initiative is setting norms for the entire industry (Österblom *et al.*, 2017). Many billionaires have used some portion of their fortune for positive environmental efforts, like Amazon founder Jeff Bezos's Earth Fund (Alberro, 2020). These examples inspire those who think inequality, rather than impeding, is contributing to sustainability transitions.

While the rich and elite deciding to change course and resolve everything is possible, society should not wait for it. First, philanthropic donations do not negate the harm from the businesses that created the wealth. While Bezos has established the Earth Fund, Amazon continues to do business in much the same way with the addition of a net zero promise (Amazon, 2017), illegally retaliating against employees who protest over its environmental action (BBC News, 2021) and actively encouraging and then profiting on overconsumption to the detriment of the planet (Frick *et al.*, 2021). Amazon and Bezos are not an unusual example. Additionally, as Saunders-Hastings (2018) explains, spending on philanthropy is simply another avenue for elites to exert their influence as they nearly always[8] specify how large financial donations should be used which is enforced by the law. Moreover, as the elite have obtained their socioeconomic status from the current system, their motivation to change that could jeopardize that wealth and dominance. As Schneider *et al*. (Schneider *et al.*, 2020) explains, viewing powerful transnational corporations as a key to the solution ignores the fact that they are a central part of the

[8] It is extremely rare for donations over 1 million USD to have no designations attached to them (Saunders-Hastings, 2018)

system that is causing the crisis. The majority should not have to hope that the elite (both individuals and corporations) will reverse their present environmentally destructive path and save the world. To avoid this and to constructively work with elite through a sustainability transition, inequality must be engaged with.

Conclusion

In conclusion, inequality is an important theory to engage with for sustainable transitions. Inequality helps explain how the present environmental crisis evolved. Elites, both corporations and individuals, have used their power to influence social decisions and regulations for their own profit at the cost of the environment. This impairs the management of common pool resources, and the harm of degradation and misuse is disproportionately felt by the marginalized members of society while the powerful can insulate themselves from it. Minimizing of inequality improves the sustainability of countries by increasing the efficiency of resource use towards wellbeing. More equal societies also can govern themselves and resource use more effectively, and increased trust from equality increases compliance with environmental regulations. Though some argue that inequality is not necessary for sustainability transitions since the socioeconomic elite could use their power to accelerate the transition, it is unproductive to hope they will substantively reform their presently profitable course. Thus, inequality is an important theory to understand the origins and potential solutions for a transition to a sustainable society.

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